CLARIFICATION OF *BORRERIA GYMNOCEPHALA*, *DIODIA GYMNOCEPHALA*, *DIODIA SCHUMANNII*, *BORRERIA FLAVOVIRENS*, AND *SPERMACOCE SCHUMANNII* (RUBIACEAE)

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ABSTRACT

Several erroneous, confused, and/or misapplied names, e.g., *Borreria gymnocephala*, *Diodia gymnocephala* and *Diodia schumannii*, have been variably assigned to the same species by many authors. The status of all these names is here clarified, and the correct name for the species involved is established as *Spermacoce schumannii* (Standl. ex Bacigalupo) Delprete.

Key Words: *Borreria*, *Spermacoce*, Rubiaceae, Goiás, Tocantins, Brazil, Argentina, Neotropics

RESUMEN

Vários nomes errados, confusos e/ou não corretamente aplicados, e.g., *Borreria gymnocephala*, *Diodia gymnocephala* e *Diodia schumannii*, foram variavelmente usados para a mesma espécie por muitos autores. A saga de todo estes nomes é aqui clarificada e o nome certo desta espécie foi estabelecido de ser *Spermacoce schumannii* (Standl. ex Bacigalupo) Delprete.

Palavras Chave: *Borreria*, *Spermacoce*, Rubiaceae, Goiás, Tocantins, Brasil, Argentina, Neotrópicos

INTRODUCTION

The present work seeks to clarify the status of the incorrect, confused, and/or misapplied names [e.g., *Borreria flavovirens* Bacigalupo & E.L. Cabral, *Borreria gymnocephala* DC., *Diodia gymnocephala* (DC.) K. Schum., *Diodia schumannii* Standl. ex Bacigalupo] of taxa related to *Spermacoce schumannii* (Standl. ex Bacigalupo) Delprete (Rubiaceae, Spermacoceae).

Candolle (1830, p. 549) described *Borreria*? *gymnocephala* DC., and was uncertain about its generic position. He cited a specimen in his herbarium without giving the collector or the specific collection locality. After the description he stated that this species, collected in Brazil, is so distinct that it could even be treated as a separate genus and is characterized by 4-angular, smooth stems between the capitate inflorescences and small corollas with included anthers.

Schumann (1888) transferred Candolle's taxon to the genus *Diodia* as *D. gymnocephala* (DC.) K. Schum. After the description, he stated that it is very similar to *Borreria latifolia* (Aubl.) K. Schum. var. *siderites* (Cham. & Schltdl.) K. Schum., from which it differed by the yellowish color of the vegetative parts and the fruit and style morphology. However, both Schumann's description and the specimens he cited apply to a mixture of two species.

According to Bacigalupo and Cabral (1998), Standley was the first to notice that Schumann's *Diodia gymnocephala* encompassed two distinct species. He annotated some herbarium specimens, which belonged to the part of *D. gymnocephala* that differed from Candolle's *Borreria gymnocephala*, as *Borreria schumannii* Standl. Bacigalupo (1974) treated this same species in volume 6, part 6 of the *Flora Ilustrada de Entre Ríos (Argentina)*, and published Standley's name as "*Diodia schumannii* Standley ex Bacigalupo, nov. nom." with Schumann's *D. gymnocephala* listed as a synonym and Candolle's *B. gymnocephala* specifically excluded. Article 69 of the ICBN (Stafleu et al. 1972) in force at that time stated that "A name is to be rejected if it is used in different senses and so has become a long-persistent source of error." Whether Bacigalupo intended to completely

reject *D. gymnocephala* (DC.) K. Schum. or was simply creating a new name for *D. gymnocephala* sensu K. Schum. is not entirely clear in this *Flora*, since no further discussion of nomenclature was provided.

Since the type of *D. gymnocephala*, i.e. *Borreria gymnocephala* DC., was explicitly excluded by Bacigalupo (1974), the citation of this earlier name does not make *D. schumannii* illegitimate under current ICBN Art. 52 (McNeill et al. 2006). But, apart from having the correct Latin form, does this name meet the other requirements under Art. 32.1 for valid publication, namely provision of a Latin description or diagnosis (since 1935) and indication of a type (since 1958)? Bacigalupo (1974) provided only a Spanish description, but her reference to Schumann's name, for which a full Latin description was provided, is an acceptable "reference to a previously and effectively published Latin description" under Art. 36. In addition, under this species Bacigalupo cited only the single specimen "Dpto. La Paz, isla Curuzú Chalí, Burkart 27.103 (SI)." When Bacigalupo (1974) published her new species, Art. 37 of the ICBN (Stafleu et al. 1972), then in effect, stated: "Publication on or after 1 Jan. 1958 of the name of a new taxon of the rank of family or below is valid only when the nomenclatural type is indicated ..." thus her citation would not then have satisfied this requirement and her new name was not validly published under the 1972 Code.

It was this fact that motivated Bacigalupo and Cabral (1998) to later propose a new name, *B. flavovirens* Bacigalupo & E.L. Cabral, to replace *Diodia schumannii* Standley ex Bacigalupo, "nom. illeg.", which had been published "sin seleccionar el tipo", although in reality this shortcoming would have affected its valid publication and not its illegitimacy. However, these authors had overlooked the fact that already in the 1988 ICBN (Greuter et al. 1988) Art. 37 had been expanded considerably to include, in Art. 37.3, the following: "for the name of a new species or infraspecific taxon, citation of a single element is acceptable as indication of the holotype." In the current ICBN (McNeill et al. 2006) this is now stated as: "for the name of a new species or infraspecific taxon, mention of a single element or gathering ..., even if that element is not explicitly designated as type, is acceptable as indication of the type." Since Bacigalupo's (1974) citation of a single specimen fulfills the requirement for a type indication, *D. schumannii* has been validly published under all editions of the ICBN since 1988. Thus *B. flavovirens* was at the outset a nomenclaturally superfluous and illegitimate replacement name for *D. schumannii*.

In their 1998 paper, Bacigalupo and Cabral finally clarified the status of *Diodia gymnocephala* (DC.) K. Schum., which from their examination of the type of the basionym, *B. gymnocephala* DC. (1830), at G-DC they determined to be synonymous with *Borreria palustris* (Cham. & Schltdl.) Bacigalupo & E.L. Cabral, this based on the earlier *Diodia palustris* Cham. & Schltdl. (1828).

A further point should be made with regard to the type of *Diodia schumannii* Standley ex Bacigalupo. Because this name was "validly published by reference to a previously and effectively published description or diagnosis," that of Schumann (1888) as has already been noted, Art. 7.7 dictates that it "is to be typified by an element selected from the context of the validating description or diagnosis, unless the validating author has definitely designated a different type." While Bacigalupo can be said to have satisfied the Art. 37 requirement for "indication" of a type, according to Art. 7.11 "designation" of a type requires the inclusion of "the term 'type' or an equivalent." So unless the term "Exsiccata" used by Bacigalupo is considered equivalent to "type," which seems unlikely, does this mean that the indication of type under Art. 37 does not qualify as designation of a different type under Art. 7.7, such that *D. schumannii* must be typified on an element cited by Schumann? It is our interpretation that in this case an "indication" in the one case is equivalent to a "designation" in the other, such that the type of *D. schumannii* is that indicated by Bacigalupo in 1974.

In conclusion, the species discussed above is maintained within the genus *Spermacoce*, as *S. schumannii* (Standl. ex Bacigalupo) Delprete, following the circumscription adopted by Delprete et al. (2005), Delprete and Cortés-B. ("2006" [2007]), and Delprete (2007).

SYSTEMATIC TREATMENT

Spermacoce schumannii (Standl. ex Bacigalupo) Delprete in A. Reis, Fl. Ilustr. Catarin. RUBI 2:754, fig. 130. 2005. *Diodia schumannii* Standl. ex Bacigalupo in A. Burkart, Fl. Ilustr. Entre Ríos 6(6):15, fig. 5. 1974. *Borreria flavovirens* Bacigalupo & E.L. Cabral, Hickenia 2: 261, fig. 1. 1998, nom. illeg. TYPE: ARGENTINA. ENTRE RIOS: Dpto. La Paz, Isla Curuzú-Chalí, 10 Apr 1968 (fl, fr), *Burkart et al. 27103* (HOLOTYPE: SI n.v.; ISOTYPE: CTES n.v.; photos-CTES at NY!, UFG!).

Diodia gymnocephala sensu K. Schum. in Mart., Fl. Bras. 6(6):16. 1888, p.p.; non *Borreria gymnocephala* DC., Prodr. 4:549. 1830 [= *Spermacoce palustris* (Cham. & Schltdl.) Delprete]

Selected specimens examined: **BRAZIL: Goiás:** Serra do Caiapó, ca. 30 km (straight line), S of Caiapônia, 950–1200 m, 29 Apr 1973 (fl, fr), *Anderson et al. 9363* (NY, UB); Serra Dourada, 16°3'S, 50°7'W, 920 m, 17 Mar 1989 (fl, fr), *Cavalcanti et al. 461* (CEN, NY[2]); Mun. Alto Paraíso, Chapada dos Veadeiros, 10 km W of Alto Paraíso, 1000 m, 24 Mar 1969 (fl), *Irwin et al. 24971* (NY, UB); Mun. Mossâmendes, Serra Dourada, ca. 6 km NE of Mossâmendes, 16°04'S, 50°11'W, 1000 m, 7 Feb 1980 (fl), *Kirkbride 3293* (NY, UB); Mun. Niquelândia, estrada Go-237 entre Niquelândia e Colinas, 14°21'S, 48°12'W, 470 m, 13 Apr 1992 (fl, fr), *Walter et al. 1226* (CEN, NY). **Mato Grosso:** Ca. 35 km (straight line) ENE of Barra do Garças, 500 m, 4 May 1973 (fl, fr), *Anderson et al. 9688* (NY, UB); roadside from base camp to main Xavantina-Cachimbo rd., km 264, 16 Nov 1967 (fl), *Philcox et al. 3068* (NY). **Minas Gerais:** Serra do Espinhaço, ca. 15 km NE of Diamantina, on rd to Mendanha, 1300 m, 26 Jan 1969 (fl), *Irwin et al. 22605* (NY); Mun. Formoso, Parque Nacional Grande Sertão Veredas, towards Faz. Diamante, 15°20'01"S, 45°56'54"W, 815 m, 29 Nov 1997 (fl), *R.C. Mendonça et al. 3308* (IBGE, NY); Mun. Diamantina, Fundo do Macaco, 1200 m, 16 May 1931 (fl, fr), *Mexia 5849* (NY). **Paraná:** Mun. Morretes, Estr. da Graciosa, Alto da Serra, 12 Feb 1965 (fl), *Hatschbach 12367* (US). **Rio de Janeiro:** Mun. Caxias, Capivarí, 30 Sep 1958 (fl), *E. Pereira 4212* (HBR); Mun. Jacarepaguá, Restinga de Jacarepaguá, 10 Sep 1958 (fl), *E. Pereira 4159* (HBR, NY). **Santa Catarina:** Mun. Lages, Alto da Serra, Encruzilhada, mata secundária, 900 m, 7 Nov 1946 (fl), *Reitz & Klein 12571* (HBR, NY); Mun. Lauro Müller, rd. SC-403, km 12, Novo Horizonte, property of Olavo Mariotti, 28°23'S, 49°28'W, 420 m, 5 Dec 1998 (fl), *Delprete et al. 6986* (HBR, MBM, MO, NY, UB, US). **São Paulo:** Mun. Atibaia, 0.5 km N of Atibaia, 24 Sep 1960 (fl), *Mattos & Mattos 8389* (NY); São Paulo, Avenida Paulista, campo, Oct 1913, *Brade 6803* (NY). **Tocantins:** Mun. Couto de Magalhães, rd. Couto de Magalhães-Colinas de Tocantins (TO-335), 5–8 km from Couto de Magalhães, 170–200 m, 08°19'29"S, 49°09'25"W, 4 Nov 2005 (fl, fr), *Delprete et al. 9267* (NY, UB, UFG); Mun. Araguaína, 15 km S of Araguaína, 300 m, 15 Mar 1968 (fl), *Irwin et al. 21199* (UB).

Distribution and ecology.—Widespread from Colombia to southern Brazil, Paraguay, and northern Argentina. In Brazil, it is known from the states of Rondonia, Mato Grosso, Goiás, Tocantins, Minas Gerais, Maranhão, Bahia, and southwards throughout Rio Grande do Sul. Mostly found at the margins of and inside gallery forests, semi-deciduous forests, and slope forests, and less frequently in seasonally flooded vegetation.

Taxonomic observations.—*Spermacoce schumannii* is very similar to *S. latifolia* Aubl. in its flexuous, somewhat climbing habit, and floral branches with 5–13 glomerules, but it differs in its cylindrical to cupular, 3–8 mm long stipular sheath [vs. short, triangular, (1–)2–5 mm long in *S. latifolia*] and commonly yellowish tinge of the vegetative parts (vs. pale to olive green).

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REFERENCES

BACIGALUPO, N.M. 1974. *Diodia schumannii*. In: A. Burkart, ed. Flora ilustrada de Entre Rios (Argentina). Tomo VI, parte VI, Dicotiledoneas Metaclamideas. Colección Cientifica del I.N.T.A, Buenos Aires, Argentina. Pp. 15–16, fig. 5.

BACIGALUPO, N.M. and E.L. CABRAL. 1998. Nota sobre dos especies de *Borreria* (Rubiaceae-Spermacoceae). Hickenia 2(56):261–266.

CANDOLLE, A.P. DE. 1830. *Borreria ? gymnocephala*. Prodromus 4:549. Treuttel & Würtz, Paris.

Chamisso, L.A. von and D.F.L. von Schlechtendal. 1828. De plantis in expeditione speculatoria Romanzoffiana observatis, Rubiaceae, Sectio III Spermacoceae. Linnaea 3:309–366.

Delprete, P.G. 2007. New combinations and new synonymies in the genus *Spermacoce* (Rubiaceae) for the Flora of Goiás and Tocantins (Brazil) and the Flora of the Guianas. J. Bot. Res. Inst. Texas 1:1023–1030.

Delprete, P.G. and R. Cortés-B. 2006 [2007]. A synopsis of the Rubiaceae of the states of Mato Grosso and Mato Grosso do Sul, Brazil, with a key to genera, and a preliminary species list. Rev. Biol. Neotrop. 3:13–96.

Delprete, P.G., L.B. Smith, and R.B. Klein. 2005. Rubiáceas, Volume 2 - Gêneros de G–Z: 20. Gardenia até 46. Tocoyena. In: A. Reis, ed. Flora Ilustrada Catarinense. Herbário Barbosa Rodrigues, Itajaí, Santa Catarina, Brazil. Pp. 345–843.

Greuter, W., H.M. Burdet, W.G. Chaloner, V. Demoulin, R. Grolle, D.L. Hawksworth, D.H. Nicolson, P.C. Silva, F. A. Stafleu, E. G. Voss, and J. McNeill. 1988. International code of botanical nomenclature adopted by the Fourteenth International Botanical Congress, Berlin, July–August 1987. Koeltz Scientific Books, Königstein.

McNeill, J., F.R. Barrie, H.M. Burdet, V. Demoulin, D.L. Hawksworth, K. Marhold, D.H. Nicolson, J. Prado, P.C. Silva, J.E. Skog, J.H. Wiersema, and N.J. Turland. 2006. International code of botanical nomenclature (Vienna Code) adopted by the Seventeenth International Botanical Congress, Vienna, Austria, July 2005. A.R.G. Gantner Verlag, Ruggell, Liechtenstein.

Schumann, K. 1888. *Diodia gymnocephala* (DC.) K. Schum. In: C.F.P. von Martius, A.G. Eichler, and I. Urban, eds. Flora Brasiliensis 6(6):16–17. Fleisher, Leipzig.

Stafleu, F.A., C.E.B. Bonner, R. McVaugh, R.D. Meikle, R.C. Rollins, R. Ross, J.M. Schopf, G.M. Schulze, R. de Vilmorin, and E.G. Voss. 1972. International code of botanical nomenclature adopted by the Eleventh International Botanical Congress, Seattle, August 1969. A. Oosthoek's Uitgeversmaatschappij N.V., Utrecht.